

# Preoperative evaluation of pelvic kidney renal cell carcinoma with 64-slice CT and 3D-CT angiography

Mohammad H. Izadpanahi, Mahmoud Kabiri, Hamid Mazdak, Kia Nouri-Mahdavi, Mohammad H. Khorrami

Department of Urology, Al-Zahra Hospital, Isfahan University of Medical Sciences, Isfahan, Iran

## Abstract

We report a case of a 55-year-old woman, who presented with a vague pelvic pain and was found to have an ectopic pelvic kidney involved by a mass. Preoperative assessment was done by multi-slice CT and 3D-CT angiography. According to our knowledge only eight cases of pelvic kidney tumor have been reported in the literature and our case is the first report of using multi-slice CT and 3D-CT angiography in the preoperative evaluation of these cases.

**Key Words:** 3D-CT, ectopic kidney, multislice CT scan, renal cell carcinoma

## Address for correspondence:

Dr. Mohammad Hossein Izadpanahi, Urology and Renal Transplantation Research Center, Al-Zahra Hospital, Isfahan University of Medical Sciences, Isfahan, Iran. E-mail: mh\_izadpanahi@yahoo.com

**Received:** 02.12.2011, **Accepted:** 19.11.2012

## INTRODUCTION

The occurrence of renal cell carcinoma (RCC) is an extremely rare phenomenon in an ectopic kidney. We present a patient suspected of having a renal mass on ultrasonographic examination. Preoperatively, she underwent a 64-slice CT and 3D-CT angiography that provided an accurate description of the anatomy of the ectopic kidney, the mass, adjacent tissues, and most importantly, ectopic kidney vasculature. The vascular supply of the kidney as shown by 3D-CT angiography was confirmed intraoperatively. Histological examination showed a PT2N0Mx clear type of renal cell carcinoma. Only eight cases<sup>[1-3]</sup> of RCC occurrence in pelvic kidney have been reported

in the literature but to our knowledge, this is the first report of the use of 64-slice CT and 3D-CT angiography in the preoperative assessment of a pelvic kidney tumor.

## CASE REPORT

A 55-year-old woman was referred to our outpatient clinic with a one-month history of vague pelvic pain not associated with urinary symptoms or gross hematuria. The patient had a past history of a well-controlled hypertension and five uncomplicated vaginal deliveries. Physical examination was unreliable due to severe obesity. Abdomino-pelvic sonography and DMSA scan performed at another institution demonstrated a normal located left kidney with a proper cortical function and an ectopic right kidney in the bony pelvis with a  $7.8 \times 4.3$  cm heterogeneous mass in its lower portion. The patient was admitted in our department for further evaluation. Metastatic work-up was negative. A Multi slice CT and 3D-CT angiography of abdomen and pelvis was obtained. No oral agent was administered. After performing an unenhanced CT, 150 ml of

Access this article online	
Quick Response Code:	Website: www.advbiores.net
	DOI: 10.4103/2277-9175.146376

Copyright: © 2014 Izadpanahi. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

**How to cite this article:** Izadpanahi MH, Kabiri M, Mazdak H, Nouri-Mahdavi K, Khorrami MH. Preoperative evaluation of pelvic kidney renal cell carcinoma with 64-slice CT and 3D-CT angiography. Adv Biomed Res 2014;3:250.

contrast material was injected intravenously. Arterial phase images were obtained after a 20-second delay with a collimation of 3 mm, table speed of 1 mm per revolution and an image reconstruction interval of 1 mm. The arterial phase was used to depict the renal arteries. Parenchymal-phase imaging was initiated 240 seconds after injection of contrast material with a collimation of 3 mm, a table speed of 2 mm per revolution, and an image reconstruction interval of 2 mm. Multi-slice parenchymal-phase CT scanning of the pelvis showed a heterogenous mass consisting of multiple solid and cystic areas arising from the lower portion of the ectopic pelvic kidney replacing most of the normal renal parenchyma [Figure 1]. In addition, 3D-CT angiography demonstrated the blood supply of the pelvic kidney to arise from a single renal artery originating from the right common iliac artery just below the aortic bifurcation [Figure 2]. In axial and coronal images there was an artery suspected to supply the renal mass but after 3D reconstructions was proved to cross just parallel to the kidney [Figure 2].

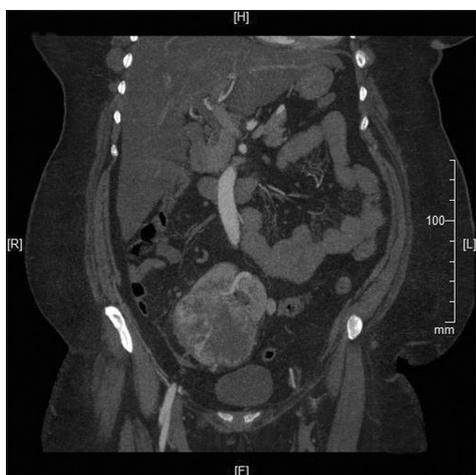
The patient underwent radical nephrectomy without any peri-operative complication and was discharged on third post-operative day. On pathologic examination, the tumor was confirmed to be a renal cell carcinoma, clear type, and confined to the kidney. No evidence was found of renal vein involvement or lymph node metastasis.

## DISCUSSION

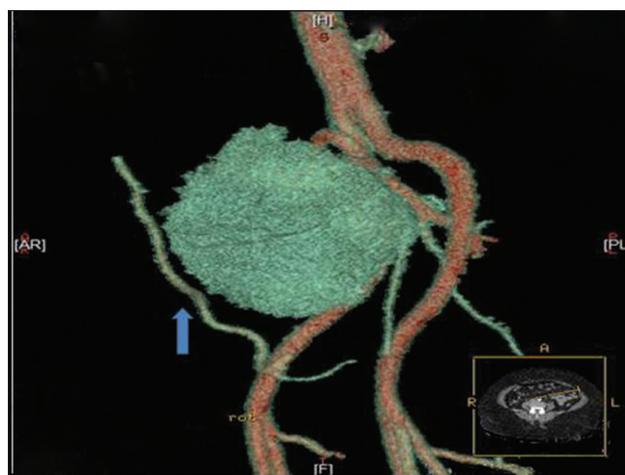
Renal ectopia is a condition in which the kidney fails to reach its normal location in the renal fossa. The kidney may be found in pelvic, iliac, abdominal, thoracic, or contralateral location. On the basis of autopsy series, the incidence of pelvic kidney

is believed to range from 1:900 to 1:1200 without any sex predilection. Associated anomalies with renal ectopia are well known and most commonly involve the genitourinary, musculoskeletal, and cardiovascular systems. (1) However, association of renal cell carcinoma and renal ectopia is extremely rare, with only eight cases reported worldwide.<sup>[1-3]</sup> The rare occurrence of these two entities is surprising, because renal cell carcinoma is the most common malignant renal tumor in adults,<sup>[1]</sup> and renal ectopia is a relatively common anomaly.

Surgical planning is usually enhanced by preoperative information about tumor location in the renal parenchyma; proximity to renal collecting system and the renal vessels; presence of fat planes between the tumor and adjacent organs; tumor extension in to renal vein or IVC. The presence of intra-abdominal metastasis, the function of the contralateral kidney, and the appearance of the adrenal glands should also reliably assessed.<sup>[4]</sup> Three-dimensional CT imaging and CT angiography have many advantages in the evaluation of renal masses compared to routine renal CT protocols. Three dimensional applications provide rotation of the kidney image in different positions and facilitate obtaining cut planes; hence, the relationship of the mass with the renal tissue and adjacent organs is enhanced and the mass is defined to its finest detail.<sup>[5]</sup> On the other hand because of the location and unpredictable vascular anatomy of the ectopic kidney, vascular mapping is essential when planning a nephrectomy. 3D-CT angiography provides more accurate images regarding the vascular anatomy of the kidney. Identification of the relationship of the mass with adjacent vessels with 3D-CT angiography has been also shown to affect the treatment procedure and decreases possible operative complications.<sup>[5]</sup>



**Figure 1:** Multi-slice CT showed a heterogenous mass arising from the lower portion of the ectopic pelvic kidney



**Figure 2:** In axial and coronal images there was an artery suspected to supply the renal mass but after 3D reconstructions it was proved to cross just parallel to the kidney (arrow)

In our patient, 64-slice CT and 3D-CT angiography proved to be an ideal, non invasive modality that clearly showed the anatomy of the pelvic kidney, its tumor, kidney vasculature and relationship of the kidney with the great vessels. The vascular supply of the kidney as shown by 3D-CT angiography was confirmed at surgery.

## CONCLUSION

To our knowledge this is the first report of using multi-slice CT and CT angiography in the surgical planning for nephrectomy in a pelvic kidney involved by renal cell carcinoma. Multi-slice CT and 3D-CT angiography is an appropriate imaging modality when surgery is required for removal of an ectopic kidney.

## REFERENCES

1. Kocak M, Sudakoff GS, Ericson S, Begun F, Datta M. Using MR angiography for surgical planning in pelvic kidney renal cell carcinoma. *AJR Am J Roentgenol* 2001;177:659-60.
2. Terrone C, Destefanis P, Fiori C, Savio D, Fontana D. Renal cell cancer in presacral ectopic kidney: Preoperative diagnostic imaging compared to surgical findings. *Urol Int* 2004;72:174-5.
3. Mahmoudnejad N, Danesh A, Abdi H. Renal cell carcinoma in presacral pelvic kidney. *J Pak Med Assoc* 2009;59:482-3.
4. Dighe M, Takayama T, Bush WH. Preoperative planning for renal cell carcinoma- benefits of 64-slice CT imaging. *Int Braz J Urol* 2007;33:305-12.
5. Toprak U, Erdogan A, Gulbayrak M, Karademir MA, Paolucci E, Akar OE. Preoperative evaluation of renal anatomy and renal masses with helical CT, 3D-CT and 3D-CT angiography. *Diagn Interv Radiol* 2005;11:35-40.

**Source of Support:** Nil, **Conflict of Interest:** None declared.